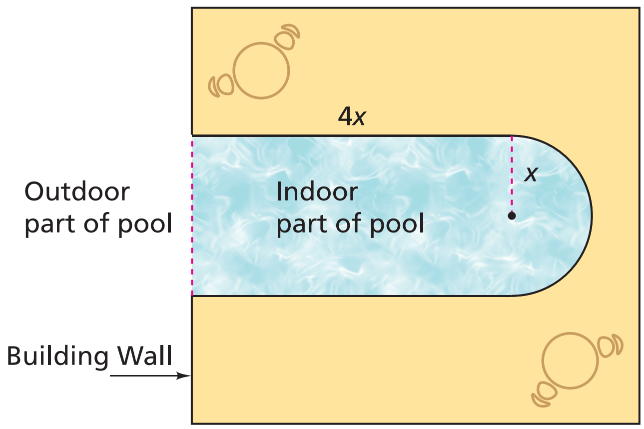
1.3 The Community Pool Problem

In this problem, we will interpret symbolic statements and use them to make predictions.

A community center is building a pool, part indoor and part outdoor. A diagram of the indoor part of the pool is shown. The indoor shape is made from a half-circle with radius x and a rectangle with length $4x$.



Problem 1.3 Interpreting Expressions

The exact dimensions of the community center pool are not available, but the area A of the whole pool is given by the equation:

$$A = x^2 + \frac{\pi x^2}{2} + 8x^2 + \frac{\pi x^2}{4}$$

A. Which part of the expression for area represents

1. the area of the indoor part of the pool? Explain.
2. the area of the outdoor part of the pool? Explain.

B. **1.** Make a sketch of the outdoor part. Label the dimensions.

2. If possible, draw another shape for the outdoor part of the pool. If not, explain why not.

C. Stella and Jeri each rewrote the expression for the area of the outdoor part of the pool to help them make a sketch.

$$\text{Stella: } x^2 + \frac{\pi x^2}{8} + \frac{\pi x^2}{8}$$

$$\text{Jeri: } \left(\frac{1}{2}x\right)\left(2x\right) + \frac{\pi x^2}{4}$$

1. Explain the reasoning each person may have used to write their expression.
2. Decide if these expressions are equivalent to the original expression in Question A, part (2). Explain your reasoning.

D. Does the equation for the area of the pool represent a linear, exponential, or quadratic relationship, or none of these? Explain.

ACE **Homework starts on page 12.**

1.4 Diving In

In the pool tile problems, you found patterns that could be represented by several different but equivalent symbolic expressions, such as:

$$4s + 4$$
$$4(s + 1)$$
$$s + s + s + s + 4$$
$$2s + 2(s + 2)$$

The equivalence of these expressions can be shown with arrangements of tiles. Equivalence also follows from properties of numbers and operations.

An important property is the **Distributive Property:**

For any real numbers a, b, and c:

$$a(b + c) = ab + ac \quad \text{and} \quad a(b - c) = ab - ac$$

For example, this property guarantees that $4(s + 1) = 4s + 4$ for any s.

We say that $a(b + c)$ and $4(s + 1)$ are in *factored form* and $ab + ac$ and $4s + 4$ are in *expanded form*.

The next problem reviews the Distributive Property.